

# Monarch Tales



## In a Nutshell



Students act out the life cycle of the monarch butterfly to understand the importance of milkweed to the survival of this insect. Students then participate in a milkweed mapping project on the refuge.

Grades	1-3
Seasons	Fall/Spring
Location	Visitor Center

## Learning Objectives

After participating in this activity, student will be able to:

- name the 4 stages of the monarch butterfly: egg, caterpillar, pupae, and adult.
- identify milkweeds as the main food source of the monarch caterpillar.
- describe how monarch caterpillars grow from first instar to 5<sup>th</sup> instar, increasing in size with each shed.
- relate the number of milkweed plants to the monarch butterfly population.
- explain the importance of habitat conservation to monarch butterflies.
- give at least one example of another member of the milkweed community.

## Literature Connections

Monarch! Come Play with Me by Ba Rea

Monarch and Milkweed by Helen Frost and Leonid Gore (book and DVD)

Monarch Butterfly by Gail Gibbons



An Extraordinary Life: The Story of a Monarch Butterfly by  
Laurence Pringle

**Pre-Activities**

Students act out the life cycle of the monarch butterfly.

**On-site Activities**

Students participate in a milkweed mapping project on the refuge. They learn to identify common milkweed plants in various stages of growth and mark their location on maps. They also discover and learn about the many other members of the “milkweed community”.

\*Monarch tagging may be conducted as part of the

**Teacher's Classroom Connection**

Use “Map the Monarch's Route” from the Monarchs in the Classroom K-2 Curriculum Guide.

Have the students take the Monarch Quiz again to see how much they learned.

Raise monarchs in the classroom in the fall/spring for tagging and releasing.

**Teacher Resources**

Milkweed, Monarchs and More: A Field Guide to the Invertebrate Community in the Milkweed Patch by Ba Rea, Karen Oberhauser and Michael Quinn

Monarch Magic! Butterfly Activities & Nature Discoveries by Lynn Rosenblatt

The Monarch Butterfly: Biology and Conservation by Karen Oberhauser

The Monarch Butterfly: Uniting a Continent by Karen Oberhauser  
La Mariposa monarca: uniendo un continente by Karen

Oberhauser

Butterfly and Moth Care Guide by Andrew Wendt, intern, Rapids Lake Education and Visitor Center



## Monarch Tales Pre-Activity

### Materials

- Several plastic leaves, one with velcro attached
- Small Styrofoam ball with velcro attached
- Black body pillow cover
- Green body pillow cover
- Clear plastic shower liner
- Monarch costume wings
- Pipe cleaner Proboscis
- One large dark sheet that serves as a production “curtain”

### Introduction/ Background

Discuss the human life cycle with students. Assist them with listing the stages of human development:

Infant – Toddler – Preschooler – Child – Pre-teen – Teenager – Young Adult – Adult – Senior

Next, ask them if they have ever seen a monarch butterfly. Show a picture of a monarch and explain that monarchs, like humans, undergo changes throughout their life. However, their changes, termed *metamorphosis*, do not just involve growing bigger or getting older. *Metamorphosis* comes from 2 Greek words which together mean *new life*. Organisms that go through metamorphosis are literally changing their entire body form as they grow into adults.

### “Re-enacted” Story of the Monarch Life Cycle

Explain to students that you are going to tell them the **Story of the Monarch Life Cycle** using pictures to illustrate each stage a monarch goes through on its way to becoming an adult.

This story can be presented in two ways.

Option 1 is to only use the laminated pictures to illustrate each life stage while reading the story printed on the back of the pictures.

Option 2 includes selecting student volunteers to act out metamorphosis through 6 scenes as the story is read aloud to the class.

Tell the class that you will need volunteers to assist in this theatrical production. Explain each job as described below:

- **Narrator:** Sets the “stage” for each scene. In this production the Refuge Ranger will act as the production narrator.
- **Casting Director:** In this production, the classroom teacher will act as the Casting director by selecting the actors needed for each scene.
- **Set Operators:** Two student volunteers will be selected from the audience to close and open the production curtain between scenes. They will open the curtain when they hear the word “action” and close the curtain when they hear the word “cut”.  
*(Select two volunteers now.)*
- **Actors:** Students will be selected to act out each scene. The casting director will select a new set of actors before each scene. They should listen to the narrator for clues on how they should act out the scene.

# The Story of the Monarch Life Cycle

## Scene 1: ADULT and Milkweed

### CASTING DIRECTOR

- Select three student volunteers to come up in front of the class to hold the artificial “milkweed” plants.
- Select another student volunteer to put on the monarch wings and flutter around the milkweed.

### NARRATOR

“**ACTION**”: “Before a monarch even has a chance to begin its life there must be milkweed. There are hundreds of different kinds of milkweed. Milkweed is critical to the survival of the monarch because it is the only place a female monarch will lay her eggs and it is the only thing the monarch caterpillar will eat. It is commonly believed that milkweed protects the monarch because it contains a toxin that makes it distasteful to predators (the monarch’s bright colors are a warning).”

“**CUT**”

# The Story of the Monarch Life Cycle

## Scene 2: EGG

### CASTING DIRECTOR

- Hand your volunteer “monarch” a styrofoam “egg” and direct them to attach it to the bottom of the plastic “milkweed” leaf (where the Velcro is attached).

### NARRATOR

**“ACTION”:** “Once a female monarch butterfly finds a milkweed plant, she lays a single egg on it and the 1<sup>st</sup> stage of life for a new monarch begins. Monarchs lay their eggs on the underside of the milkweed leaf to protect them from weather and predators. Monarchs only lay one egg per leaf and between 100 and 300 eggs in their lifetime.”

**“CUT”**

# The Story of the Monarch Life Cycle

## Scene 3: INSTAR(s)

### CASTING DIRECTOR

- Select up to four students to become “instars” and act out “shedding” their exoskeleton.
- Have the smallest student climb into the body pillow feet first. This will be the first instar. Ask him/her to leave his/her head out of the cover so he/she can hear and see what is happening.
- After the first “instar” student molts, eats its exoskeleton, and nibbles on the milkweed as directed by the narrator, send him/her back to his/her seat in the audience. This is the signal for the next “instar” to begin its molt.

### NARRATOR

**“ACTION”:** Because monarchs are insects, they wear their skeleton on the outside of their body (exoskeleton). As they grow bigger and bigger, the exoskeleton gets tighter and tighter until it is time for the monarch to shed its skin, or molt.” Each time the Caterpillar sheds, it eats its old skin before snacking on more milkweed leaves.

The intervals between molts are called instars. Monarchs go through five instars. Each Caterpillar here represents a different instar.

**“CUT”**

# The Story of the Monarch Life Cycle

## Scene 4: CHRYSALIS

### CASTING DIRECTOR

- Select another volunteer to represent the “chrysalis”. Direct them to climb into green pillow case feet first.
- Next direct them to climb into the black body pillow feet first completely hiding the green color underneath.

### NARRATOR

“**ACTION**”: Once the monarch caterpillar reaches its 5<sup>th</sup> instar, it’s time for the metamorphosis to begin. The monarch finds a good place to transform and spins a silk pad where it will hang upside-down. It then begins to shed its skin one last time and attaches to its silk pad. Underneath its caterpillar skin, a green pupa, or chrysalis, has formed. Now the monarch is in the 3<sup>rd</sup> stage. The monarch hangs protected in its chrysalis for 8 to 15 days.

“**CUT**”



# The Story of the Monarch Life Cycle

## Scene 5: EMERGING ADULT

### CASTING DIRECTOR

- Direct the “chrysalis” student to take off the green pillow case.
- Select one volunteer to put on the butterfly wings and the black body pillow case. Wrap the student in the plastic shower curtain liner.

### NARRATOR

“**ACTION**”: The day before the metamorphosis is complete, the pigmentation, or color, on their wings develops and can be seen through the chrysalis. When the monarch is ready, it will break out of its chrysalis and begin the 4<sup>th</sup> stage of its life cycle, the adult, or butterfly, stage. Remove the plastic and let the new “adult” pump its wings until it is ready to “fly” around the room.

When it emerges, its wings are wet and very delicate. It must sit still and pump blood into its wings and let them dry out in the sun. After an hour or two the monarch butterfly is ready to fly!

“**CUT**”

# The Story of the Monarch Life Cycle

## Scene 6: FEEDING ADULT

### CASTING DIRECTOR

- Select 3 volunteers to hold the artificial “milkweed” plants (leaves and flowers).
- Give the monarch butterfly a pipe cleaner proboscis.

### NARRATOR

“**ACTION**”: In addition to its new wings, the monarch also has a new way of eating. Instead of having a sharp mouth part for cutting and chewing leaves, the monarch butterfly has a proboscis which it uses like a straw to drink nectar from flowers. Hand the “adult” a proboscis in order to “feed” from the milkweed flowers.

“**CUT**”

## Wrap-up

Review with students the life cycle of the monarch butterfly using the new vocabulary presented. Can they name each stage of life the caterpillar goes through from egg, growing and shedding as five instars, into a chrysalis, and finally hatching into the adult butterfly.

After the review, show students the time-lapsed video, *Monarch Hatching*, which was created by refuge staff. Use the narrative below to describe how this video came about.

1. In late July of 2011, refuge staff found monarch caterpillars on milkweed plants growing near the Gehl-Mittlested House on the Rapids Lake Unit of Minnesota Valley National Wildlife Refuge. A total of 7 caterpillars were collected that day, two of which were still in the egg form. The one in the video was a newly hatched 1<sup>st</sup> instar.
2. This first instar spent 21 days (3-weeks) eating and growing. Staff added fresh milkweed to the insect's enclosure daily. On the 22<sup>nd</sup> day the caterpillar, now a 5<sup>th</sup> stage instar, moved off the milkweed leaves, crawled to the top of the enclosure, and attached himself by spinning a silk pad. Within 24 hours the crysalization process was complete. Staff was not in the office to see the actual transformation. They returned to find the instar now hanging from the top of the enclosure.
3. The monarch caterpillar was in the green chrysalis form for one week before the outer shell of the chrysalis became clear and the orange and black body and wings on the developing butterfly could be seen. At this point, staff set-up a video camera and waited for the butterfly to emerge.
4. The entire process; hatch out of the chrysalis, pumping body fluid into the wings, and hanging until the wings dried, took 60 minutes. A black pheromone patch (a dark black dot) appeared on each hind wing, the mark of a male butterfly. The butterfly was released the same day.

## On-site Activities

### Materials

Monarch migration map

Monarch life cycle poster

Example of milkweed in each stage of its lifecycle  
(fresh, dried and/or photo examples)

Example of monarch tags

Monarch butterfly hand puppet

Monarch caterpillar hand puppet

Milkweed Maps (one BL set and one RL set)

Clipboard and wet erase marker per team

\*Depending on availability, monarch tagging can be conducted in conjunction with the hike. If this will be included in the field trip the following will also be needed:

One butterfly net for each team

One set of current monarch tags for each team.

### Introduction

Welcome the students to the National Wildlife Refuge. Inform them that during their field trip today they will be learning more about monarch butterfly habitat and monarch migration and help biologists record the location of critical butterfly habitat on the refuge.

Begin the lesson by reviewing each part of the life cycle using the butterfly lifecycle poster. Stress the importance of milkweed to the Monarch at all stages of the plants' lifecycle. Use the fresh, dried and/or photo examples of milkweed in each of its stages (growth, flowering, seeding).

Next, introduce the fascinating cycle of monarch *migration* using the migration maps and the slides (or substitute with maps / photos).

#### Slide 1: Insect Migrators?

Most Minnesota insects hibernate or lay eggs and die with the first hard freeze. Monarchs are unique in that they are the only

butterfly in North America and one of the only insects, besides the green darner dragonfly, that migrate.

**Why do monarchs migrate?** First, monarchs, like all other insects are cold-blooded, unable to regulate their body temperature. They cannot fly when the temperatures drop even if blooming plants are still available. Secondly, as fall progresses there are fewer and fewer blooming plants carrying the nectar they feed upon.

### **Slide 2: Fall Migration Map**

Every fall, beginning in late September in Minnesota, adult monarchs begin to fly south. It's about 2,000 miles from the Twin Cities to the fir forests where the monarchs spend their winters hibernating. If you were to take the trip with the monarchs on foot (no planes, cars, or bikes!) it would take more than a month to get there and that's if you never stopped to rest! That's a long journey!

Use the monarch finger puppet (have the students give it a name) to help illustrate how long the journey is. "Fly" the monarch along the Migration Map from Minnesota to Mexico and as you go, discuss the types of obstacles that monarchs might encounter on their journey. Have the students brainstorm a list on the white board. Things to include might be weather (monarchs can't fly when it's raining, too windy, too cold, or too hot); food and rest-stops (discuss habitat loss); predators (birds, spiders, mice, cats, etc.); and humans (cars, pesticides, insect collectors, towers, buildings, etc.).

### **Slide 3: Fall Migration Timeline**

Scientists have been tracking monarch migration over the years and now know about when the migration starts and how long it takes. Monarch migration is triggered by several natural cycles: length of daylight and temperatures.

*The length of daylight is determined by the place our earth is on its orbit around the sun. This path does not change from year to year. The amount of sun we have today is the same amount we will have next year on this date.*

*Temperature however can be very changeable from year to year. It is affected by many weather events...winds, rainfall, ocean currents to name a few. This year's fall might be mild with warmer than normal temperature or monarchs might get surprised by early snowfall.*

#### **Slide 4: Winter Rest**

##### **What do monarchs do in their winter habitat?**

Once the monarch reaches Mexico, it meets up with millions and millions of other migrating monarchs and they all cluster together on the fir trees high up in the mountains. The monarchs use the fat that they have stored up on their journey south to nourish them as they hibernate through the winter.

The Oyamel (o.ja'mel) fir forests are very important for the monarchs during the winter because they provide the perfect habitat. The trees and shrubs protect them from snow, wind, and predators. The climate is not too warm and not too cold for them to survive. The fog and clouds provide moisture for the monarchs to drink. Without these special roosting sites, the monarchs could not survive.

#### **Slide 5: Spring Migration Map**

As winter ends and the days grow longer and warmer, it's time to make the trip back north to find milkweed and lay eggs to start the cycle over again. Use the butterfly and the caterpillar finger puppets to help illustrate spring migration.

As the monarch makes its way north again in March, it may encounter some of the same obstacles as in the fall. Now, on the journey north, instead of spending her time sipping nectar to store up fat, the monarch mates and lays eggs on milkweed plants. Soon the monarch that has made the long journey dies and her eggs begin to hatch. These new monarchs go through their life cycle and continue north and lay even more eggs along the way. These monarchs will only live about 3-5 weeks and it will be their children and grandchildren (our original monarch's great- and great-great-grandchildren) that will make the journey to Mexico again in the fall.

### Slide 6: Tagged Monarch

How do these great grandchildren of our original monarchs know their way back to Minnesota? Scientists are not yet sure.

Monarch tagging is one way scientist learn more and more everyday about this mystery. Show students the example of tags and where they are placed on an adult monarch butterfly.

These tags don't bother the monarchs, just like wearing jewelry does not bother most of us. They tags have an identification number that is connected to the area they were caught. It also includes an address to contact should they be recaptured or found dead.

All of the data collected is helping scientists answer questions not only about monarch life cycles and migration but also about habitat loss and climate change. Tracking the monarchs helps us understand more about what's happening in the environment.

### Milkweed Survey

Explain to students that they will help refuge biologists track changes in monarch habitat on the refuge. They will be assigned a habitat plot and asked to count the number of milkweed plants they find. Pass out their journal page. Review with them the types of information they should collect for their assigned habitat plot. Review the stages of the milkweed plant using the fresh, dried, or photo examples available so that students and leaders can easily identify milkweed plants when they find them.

Divide the class into teams so that each has an adult leader. Provide each adult with a milkweed plot map, a clipboard with a wet erase marker, and a copy of the group leader guidelines. Also provide a copy of *Milkweed, Monarchs and More* to identify and record other insects they find also using the milkweed plants.

\*Depending on availability, monarch tagging can be conducted in conjunction with the hike. If monarchs have been spotted in the area,

*instruct students how to properly collect and tag the monarchs. Use the net in a sweeping motion in the air. When a monarch is caught, grasp the net material with one hand to prevent escape. Turn the net upside down on the ground, holding the bottom point toward the sky to coax the butterfly to move deeper into the net. A second person should then slowly reach into the net and gently close all four of the butterfly's wings together and removing it from the net. A third person then places a butterfly tag on the hind wing of the monarch before it is released into the air.*

Discussion: When students return, give them time to share their discoveries. Which plots had the highest number of milkweed plants? Which had the lowest number of milkweed plants? What might be the reason for these differences? Did any groups find other members of the milkweed community?

\*Compare these numbers to those collected by other classes the previous years. Have there been changes in the plots? Are these changes good or bad for monarch populations? What could be the cause for these changes? Is there something that should be done in response to these changes?

\*Data not yet available for this component of the discussion

### Management Connections: Monitoring the Monarchs

Ask what they think is the number one threat to monarch populations. Discuss their answers and explain how habitat loss is making it more and more difficult for the monarchs to survive their long journey to and from Mexico. New homes, roads, and agricultural fields transform the natural landscape and make less space for the monarch to find food, water, and shelter.

In Mexico, the Oyamel trees where the monarchs roost are very valuable lumber and are being cut down. So, not only are the monarchs losing trees they roost on, but there are fewer trees in the surrounding forest to protect them from wind, snow, and rain. Sanctuaries have been set up to help protect the monarch's roosting sites.



Here in their summer habitat milkweed is getting harder and harder to find. Planting butterfly gardens, restoring native prairie is critical to ensuring populations can find the food they need to survive and reproduce.

## **Wrap Up**

Encourage the students to watch the monarch lifecycle in their community. When do they first monarchs arrive again in Minnesota? Where are the adults feeding? Where to you find monarch caterpillars? Keeping track of the answers to questions like these is called phenology- the study of nature's cycles. Comparisons from year to year can help scientists determine how changes in the environment affect these natural cycles of plants (the milkweed) and animals (the monarch).